



FISH PASSAGE CENTER

847 NE 19th Avenue, #250, Portland, OR 97232

Phone: (503) 833-3900 Fax: (503) 232-1259

www.fpc.org/

e-mail us at fpcstaff@fpc.org

MEMORANDUM

TO: Brian Leth, IDFG

FROM: Brandon R. Chockley

DATE: December 13, 2013

RE: Clearwater Hatchery Report (2006–2013)

The Fish Passage Center has been marking fish from the Clearwater Hatchery facility over the last several years as part of the Comparative Survival Study (CSS). For purposes of these studies data are collected on either the juvenile life stage, or both the juvenile and adult life stages. The CSS is a multi-year program that estimates survival rates over different life stages for spring and summer Chinook and steelhead produced in major hatcheries. We would like to share with you an update of some of the information we developed under these studies for the Chinook used from the Clearwater Hatchery facility in 2013 and past years.

With the marking efforts over the past several years, information on the timing and migration speed from the hatchery to Lower Granite Dam is available. In addition, as part of the CSS study, juvenile survival estimates are developed for the hydrosystem between Lower Granite and Bonneville Dams, as well as survival to adulthood of different passage histories.

Table 1 provides estimates of minimum, median, and maximum travel times for each year's release to Lower Granite Dam. Also provided are estimates of the 95% confidence limits around the estimated median travel time. For comparison purposes, separate travel times are provided for each of the different release locations (each year) as well as for all release sites combined. In addition, we are providing you with the estimated 10%, 50%, and 90% passage dates of yearling spring and summer Chinook juveniles at Lower Granite Dam (Table 2) for each of the years of tagging. As with the travel time tables, Table 2 provides these estimates for each of the release sites, as well as the entire release for each year.

Table 1. Travel times (release to LGR) of Clearwater Hatchery yearling spring (2006–2013) and summer (2011–2013) Chinook.

Migration Year	Species Released	Release Site	Release Date(s)	Travel Time (Days)			95% Confidence Limits	
				Min	Med	Max	Lower	Upper
2006	SpCH	CROOKP	4/3	22.6	36.3	73.4	33.8	41.0
	SpCH	CROOKR	3/27	11.6	41.4	83.1	41.2	41.5
	SpCH	POWP	3/22	14.5	42.9	78.9	42.6	43.4
	SpCH	REDP	3/30	8.5	37.5	82.2	37.3	37.8
	SpCH	All Sites	3/22-4/3	8.5	40.6	83.1	40.5	40.8
2007	SpCH	CROOKP	3/29	21.1	42.3	74.9	35.4	44.3
	SpCH	CROOKR	3/28	10.1	35.3	80.8	34.7	35.5
	SpCH	POWP	3/23	8.3	31.1	60.6	30.7	31.8
	SpCH	REDP	3/6, 3/31	10.6	33.0	80.2	32.7	33.4
	SpCH	All Sites	3/6-3/31	8.3	33.2	80.8	33.0	33.5
2008	SpCH	CROOKP	3/26	39.4	68.2	99.2	63.2	72.6
	SpCH	CROTRP	3/24	26.2	49.7	107.9	49.0	50.9
	SpCH	POWP	3/19-3/20	16.0	47.4	102.6	47.1	47.6
	SpCH	REDP	3/26	29.6	52.5	108.1	50.7	53.1
	SpCH	SELWY1	4/2-4/3	6.4	30.8	84.5	30.0	31.5
	SpCH	All Sites	3/19-4/3	6.4	45.7	108.1	45.5	46.2
2009	SpCH	CLEARC	3/30	4.2	27.0	66.7	26.7	27.4
	SpCH	CROOKR	4/6	5.0	36.6	78.8	36.1	37.1
	SpCH	POWP	3/23, 4/1	9.3	40.4	84.4	38.6	41.4
	SpCH	REDP	4/8	4.9	37.7	80.3	37.5	38.4
	SpCH	SELWY1	4/2	4.4	24.3	69.8	23.8	24.6
	SpCH	All Sites	3/23-4/6	4.2	31.4	84.4	30.8	31.7
2010	SpCH	CLEARC	3/25	7.7	29.0	75.6	28.7	29.2
	SpCH	POWP	3/2	46.7	59.2	96.0	58.4	59.3
	SpCH	*REDR + REDP	3/29	15.1	36.0	85.2	35.4	36.3
	SpCH	SELWY1	3/24	8.1	30.7	79.0	30.7	30.7
	SpCH	All Sites	3/2-3/29	7.7	33.2	96.0	32.7	33.4
2011	SpCH	CLEARC	3/24-3/25	3.2	30.0	115.6	29.5	30.6
	SuCH	CROOKR	3/28	4.9	36.4	106.7	35.9	36.6
	SpCH	POWP	4/5	1.8	28.5	84.4	28.3	28.7
	SpCH	REDP	3/28	7.2	43.4	93.4	42.6	43.6
	SpCH	SELWY1	3/23	4.0	33.6	60.4	33.3	33.9
	Sp/Su CH	All Sites	3/23-4/5	1.8	32.5	115.6	32.5	32.6
2012	SpCH	CLEARC	3/22	3.8	28.2	57.4	27.4	28.4
	SuCH	CROOKR	3/26	4.2	28.3	144.2	28.0	28.4
	SpCH	POWP	3/27	5.3	28.9	87.0	28.5	29.3
	SpCH	REDP	3/28, 4/3-4/4	5.5	29.3	71.5	28.4	29.8
	SpCH	SELWY1	3/21	4.1	28.5	62.4	28.1	29.1
	Sp/Su CH	All Sites	3/21-4/4	3.8	28.4	144.2	28.4	28.6
2013	SpCH	CLEARC	3/19	16.0	40.6	59.0	39.7	41.0
	SuCH	CROOKR	3/20	13.3	43.5	102.8	43.0	43.6
	SpCH	POWP	3/20-3/21	10.0	41.3	83.7	40.6	41.6
	SpCH	REDP	3/27-4/3	11.7	41.4	81.0	40.5	41.5
	SpCH	SELWY1	3/18-3/19	10.8	31.4	78.9	29.4	32.6
	Sp/Su CH	All Sites	3/18-4/3	10.0	41.1	102.8	40.7	41.4

* Only 9 PIT-tagged fish from the REDP release were detected at LGR. These 9 fish were combined with the REDR release for estimation of timing data.

Table 2. Estimated 10%, 50%, and 90% passage dates of PIT-tagged Clearwater Hatchery yearling spring/summer Chinook at Lower Granite Dam.

Migration Year	Species Released	Release Site	Release Date(s)	10% Passage Date	50% Passage Date	90% Passage Date
2006	SpCH	CROOKP	4/3	5/1	5/10	5/20
	SpCH	CROOKR	3/27	4/25	5/7	5/18
	SpCH	POWP	3/22	4/25	5/4	5/10
	SpCH	REDP	3/30	4/27	5/6	5/15
	SpCH	All Sites	3/22-4/3	4/26	5/6	5/14
2007	SpCH	CROOKP	3/29	4/26	5/10	5/17
	SpCH	CROOKR	3/28	4/17	5/1	5/14
	SpCH	POWP	3/23	4/14	4/22	5/3
	SpCH	REDP	3/6, 3/31	4/21	5/3	5/15
	SpCH	All Sites	3/6-3/31	4/16	4/30	5/13
2008	SpCH	CROOKP	3/26	5/12	6/2	6/18
	SpCH	CROTRP	3/24	5/3	5/17	6/6
	SpCH	POWP	3/19-3/20	4/21	5/7	5/18
	SpCH	REDP	3/26	5/7	5/19	6/8
	SpCH	SELWY1	4/2-4/3	4/19	5/3	5/11
	SpCH	All Sites	3/19-4/3	4/22	5/9	5/29
2009	SpCH	CLEARC	3/30	4/12	4/26	5/8
	SpCH	CROOKR	4/6	4/22	5/13	5/20
	SpCH	POWP	3/23, 4/1	4/18	5/8	5/18
	SpCH	REDP	4/8	4/27	5/16	5/21
	SpCH	SELWY1	4/2	4/14	4/26	5/8
	SpCH	All Sites	3/23-4/6	4/17	5/3	5/19
2010	SpCH	CLEARC	3/25	4/22	4/23	4/28
	SpCH	POWP	3/2	4/24	4/30	5/8
	SpCH	*REDR + REDP	3/29	4/27	5/4	5/20
	SpCH	SELWY1	3/24	4/22	4/24	4/20
	SpCH	All Sites	3/2-3/29	4/22	4/27	5/10
2011	SpCH	CLEARC	3/24-3/25	4/3	4/23	5/4
	SuCH	CROOKR	3/28	4/17	5/3	5/15
	SpCH	POWP	4/5	4/15	5/3	5/11
	SpCH	REDP	3/28	4/23	5/11	5/26
	SpCH	SELWY1	3/23	4/4	4/25	5/5
	Sp/Su CH	All Sites	3/23-4/5	4/9	4/29	5/12
2012	SpCH	CLEARC	3/22	3/29	4/21	4/30
	SuCH	CROOKR	3/26	4/13	4/24	5/7
	SpCH	POWP	3/27	4/15	4/25	5/9
	SpCH	REDP	3/28, 4/3-4/4	4/19	4/30	5/17
	SpCH	SELWY1	3/21	3/29	4/20	4/28
	Sp/Su CH	All Sites	3/21-4/4	4/6	4/24	5/8
2013	SpCH	CLEARC	3/19	4/9	4/28	5/4
	SuCH	CROOKR	3/20	4/15	5/2	5/15
	SpCH	POWP	3/20-3/21	4/12	4/30	5/13
	SpCH	REDP	3/27-4/3	4/23	5/6	5/15
	SpCH	SELWY1	3/18-3/19	4/5	4/19	5/3
	Sp/Su CH	All Sites	3/18-4/3	4/10	4/30	5/13

*Only 9 PIT-tagged fish from the REDP release were detected at LGR. These 9 fish were combined with the REDR release for estimation of timing data.

Figures 1 through 8 are provided as illustrations of the arrival timing of each group of Chinook (i.e., each release site) to Lower Granite Dam. Separate figures are provided for each migration year (2006–2013). Figure 9 is also provided as an illustration of annual differences in arrival timing for all release sites combined, over the span of tagging for CSS (2006–2013).

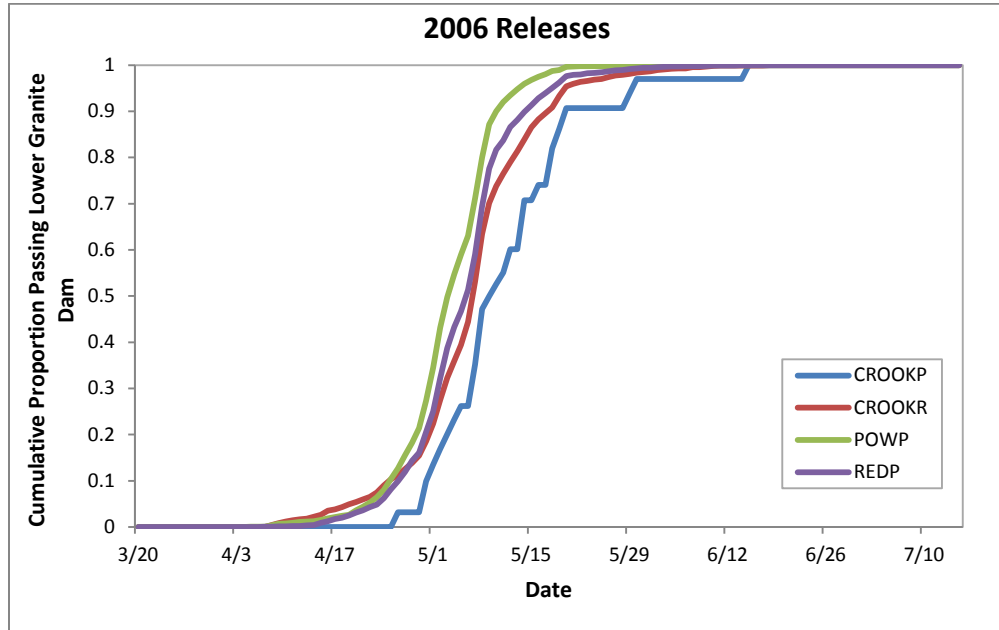


Figure 1. 2006 cumulative passage timing of Clearwater Hatchery yearling spring Chinook to Lower Granite Dam.

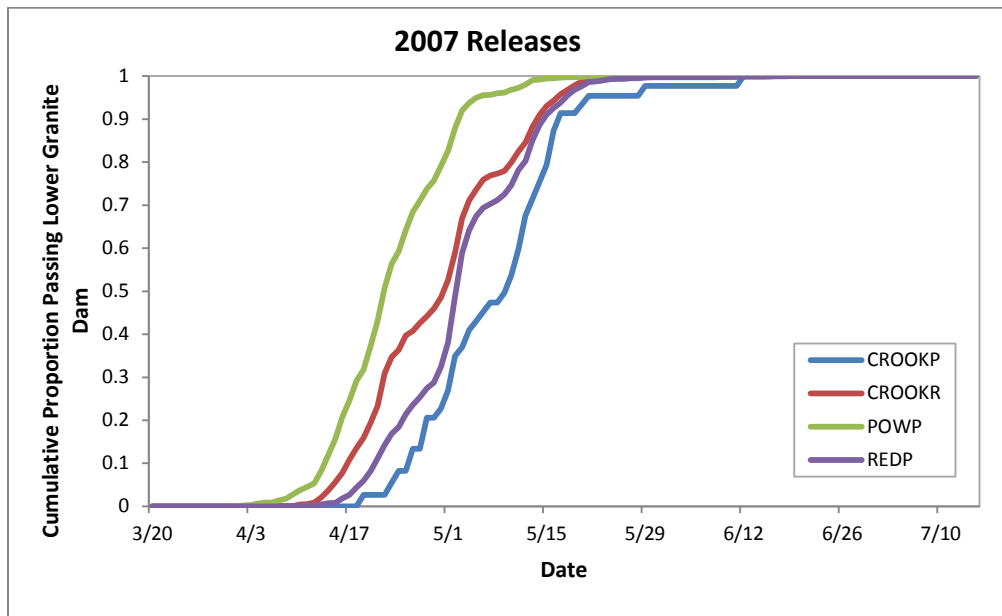


Figure 2. 2007 cumulative passage timing of Clearwater Hatchery yearling spring Chinook to Lower Granite Dam.

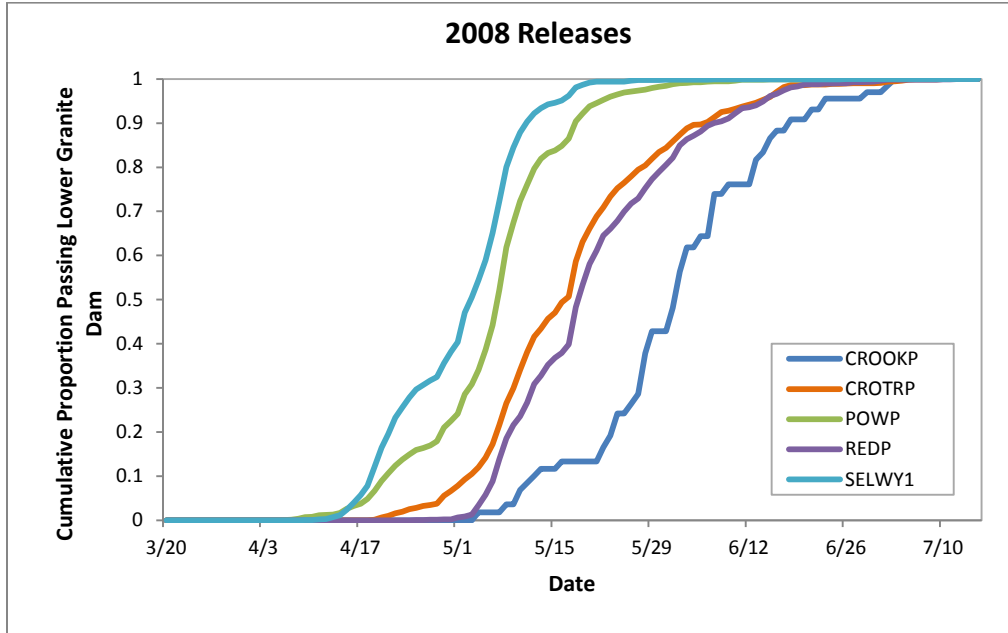


Figure 3. 2008 cumulative passage timing of Clearwater Hatchery yearling spring Chinook to Lower Granite Dam.

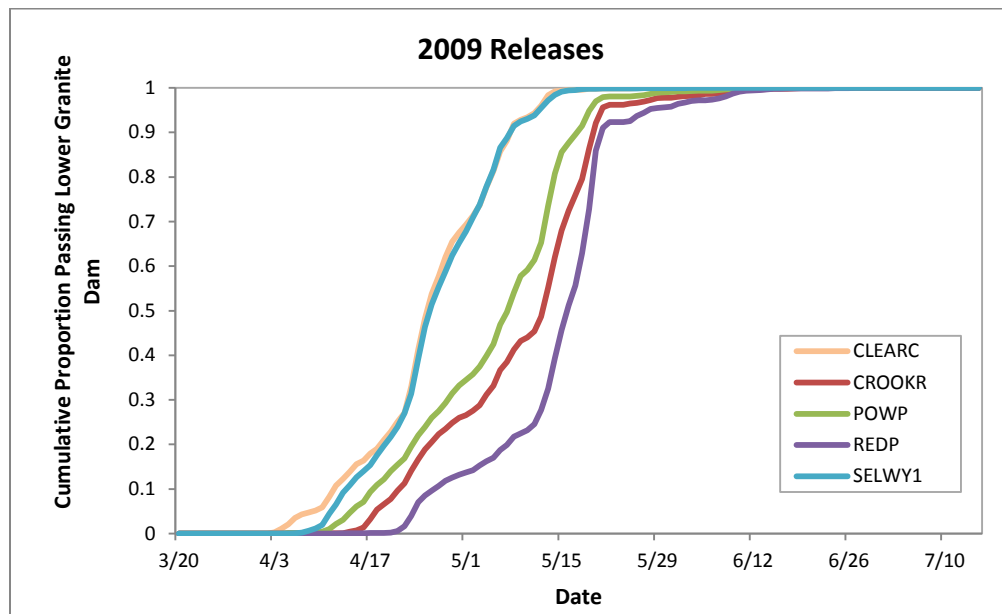


Figure 4. 2009 cumulative passage timing of Clearwater Hatchery yearling spring Chinook to Lower Granite Dam.

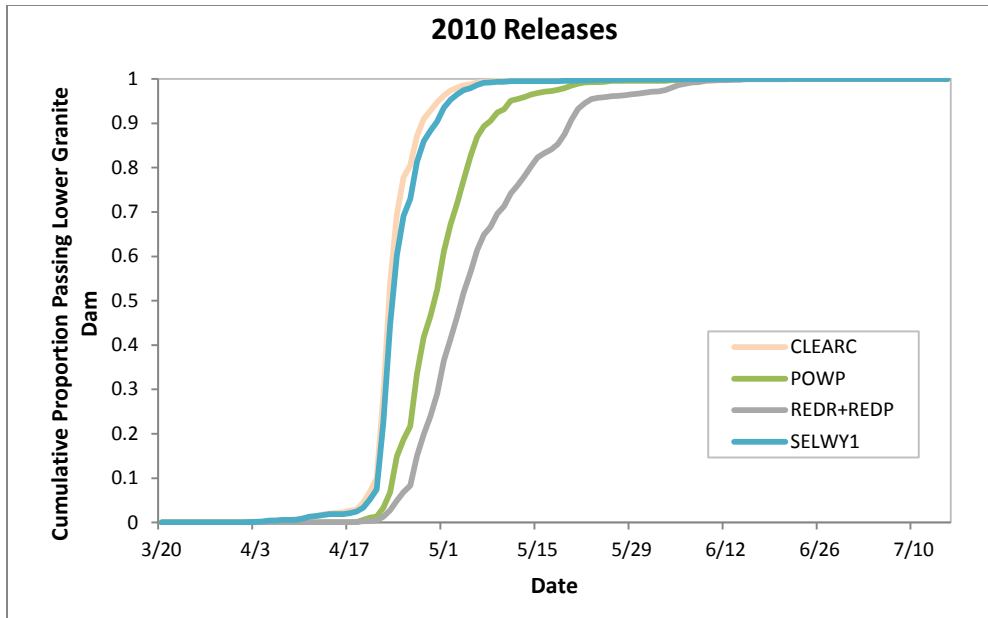


Figure 5. 2010 cumulative passage timing of Clearwater Hatchery yearling spring Chinook to Lower Granite Dam. Only 9 PIT-tagged fish released at REDP were detected at LGR. These fish were combined with the REDR releases for a single timing curve.

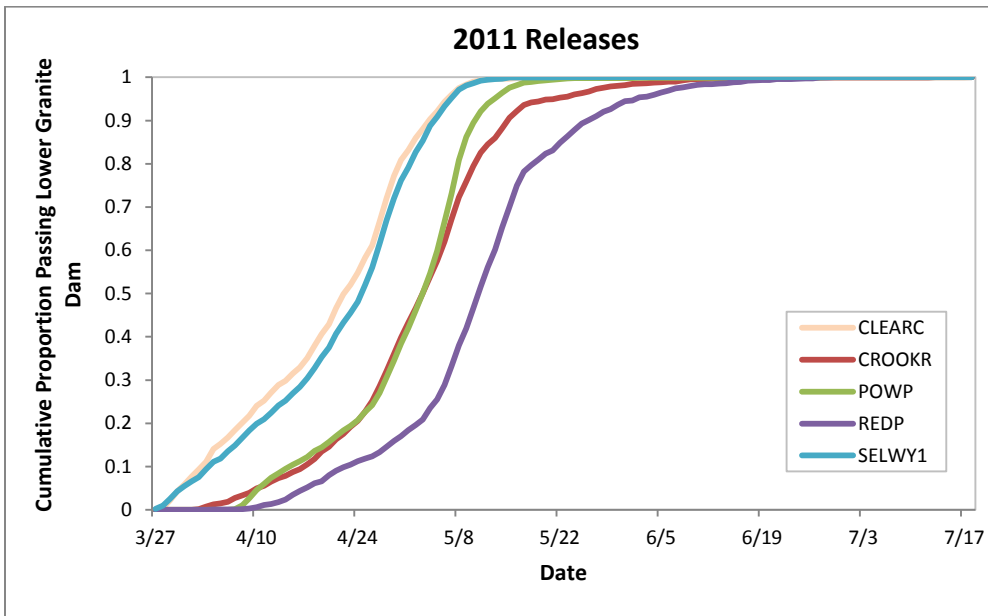


Figure 6. 2011 cumulative passage timing of Clearwater Hatchery yearling spring and summer Chinook to Lower Granite Dam. Chinook released at CROOKR were summer Chinook.

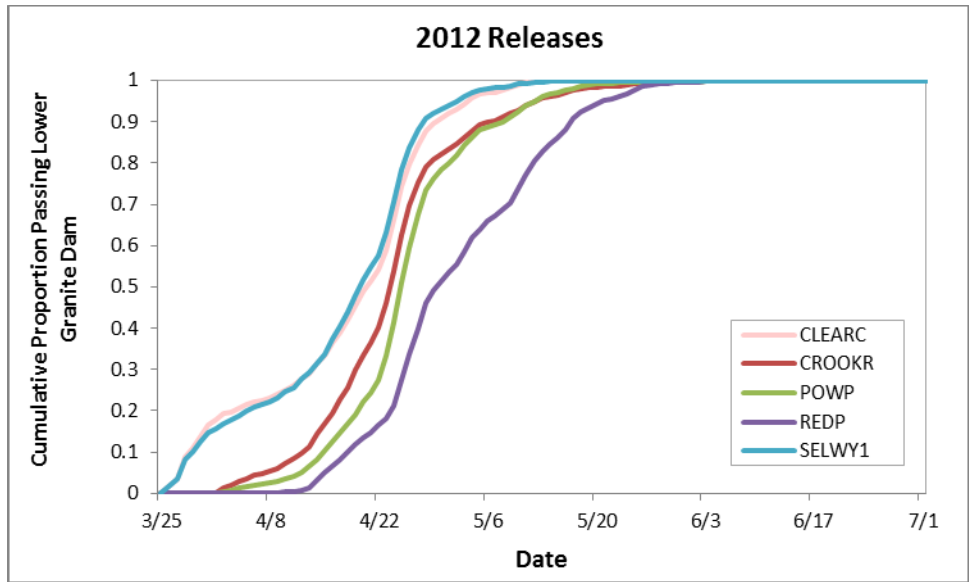


Figure 7. 2012 cumulative passage timing of Clearwater Hatchery yearling spring and summer Chinook to Lower Granite Dam. Chinook released at CROOKR were summer Chinook.

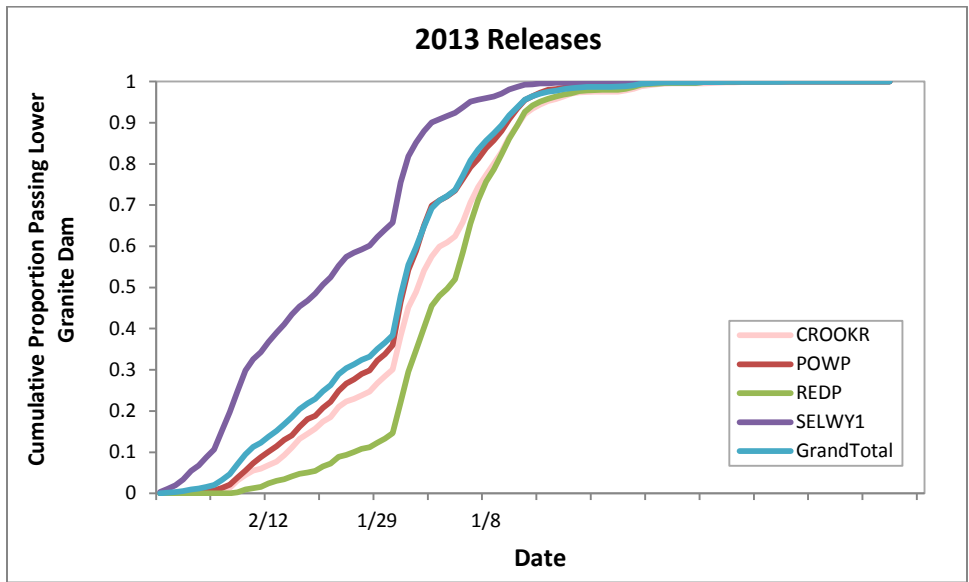


Figure 8. 2013 cumulative passage timing of Clearwater Hatchery yearling spring and summer Chinook to Lower Granite Dam. Chinook released at CROOKR were summer Chinook.

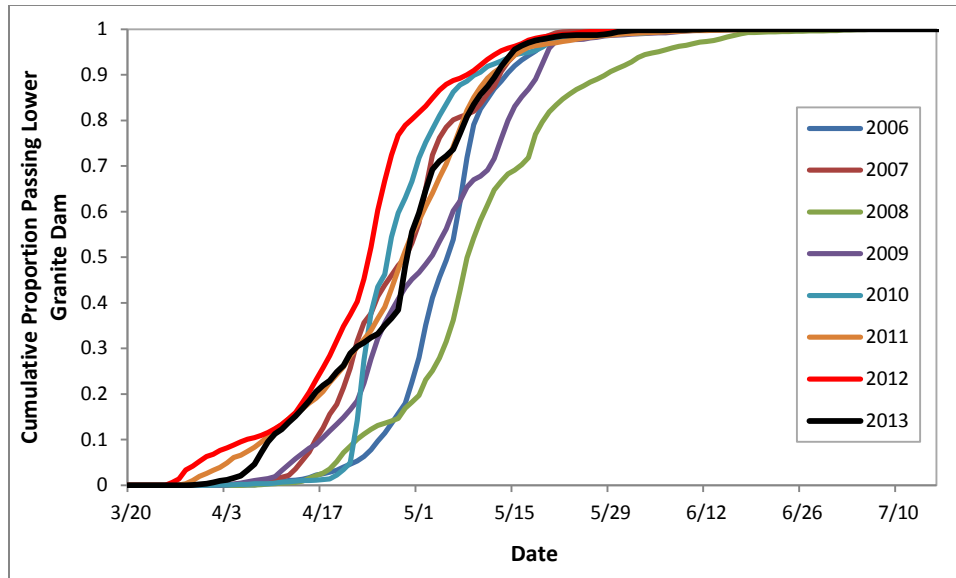


Figure 9. Cumulative passage timing of Clearwater Hatchery yearling spring/summer Chinook (all release sites combined) to Lower Granite Dam (2006–2013).

Figures 10 and 11 are provided below to illustrate the out-migration conditions that these spring migrants may have experienced in the Snake and Lower Columbia rivers. Figure 10 provides the total spring flow volume (April 3–June 20) for the Snake River (as measured at Ice Harbor), along with the average spring spill proportions at each of Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams, for each migration year. Figure 11 provides the total spring flow volume (April 10–June 30) for the Lower Columbia (as measured at Bonneville), along with the average spring spill proportions at each of McNary, John Day, The Dalles, and Bonneville dams, for each migration year.

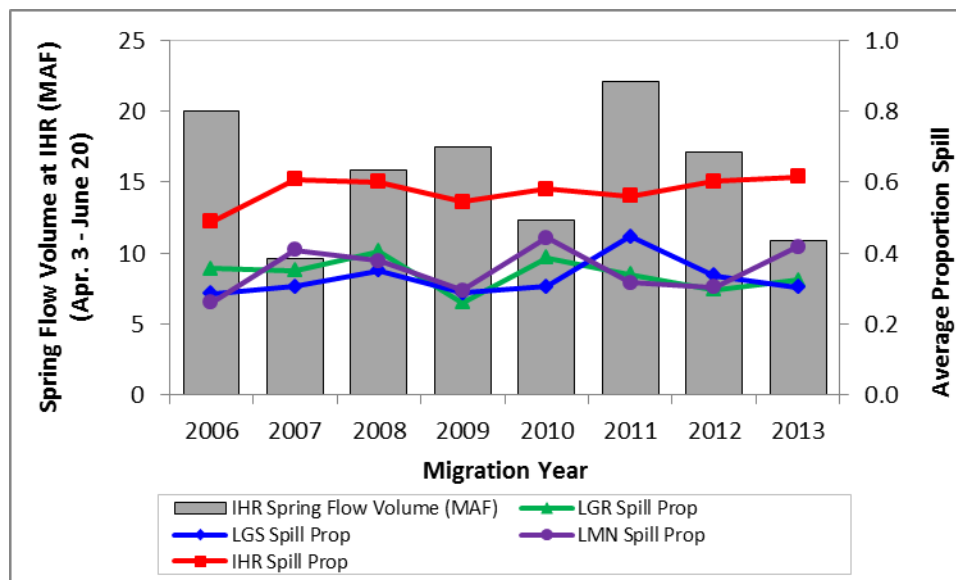


Figure 10. Total spring flow volume in the Snake River (at Ice Harbor Dam) and average spill proportion at Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams. Spring period in the Snake River is April 3–June 20.

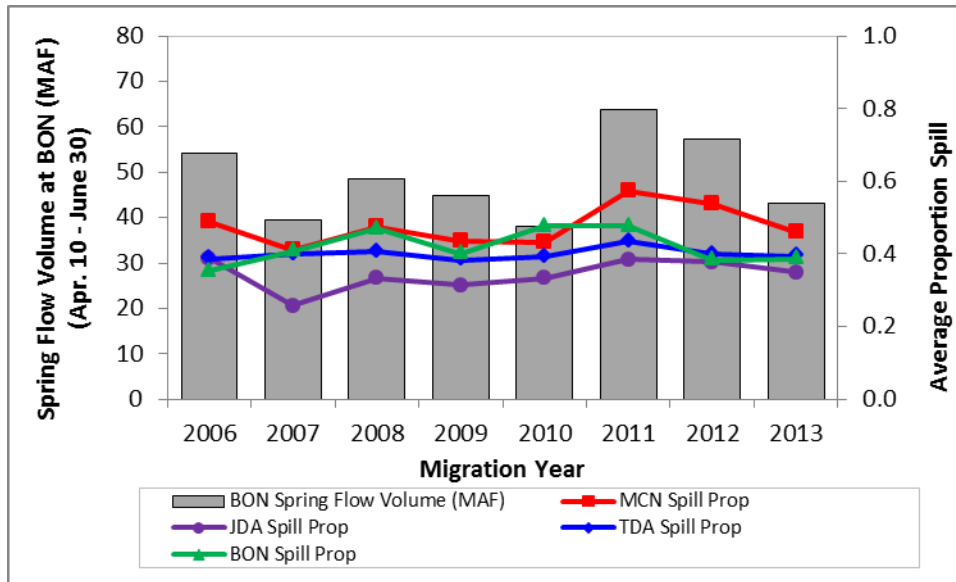


Figure 11. Total spring flow volume in the Lower Columbia River (at Bonneville Dam) and average spill proportion at McNary, John Day, The Dalles, and Bonneville dams. Spring period in the Lower Columbia River is April 10–June 30.

The table below contains estimates calculated in the CSS study of juvenile survival in the hydrosystem between Lower Granite and Bonneville Dams and the survival to adulthood of spring Chinook (Table 3) in several categories. Those categories are SAR(T), SAR(C₀), and Weighted SAR_{LGR-10-LGR}, where SAR(T) represents smolts transported from Lower Granite, Little Goose, or Lower Monumental Dam, SAR(C₀) represents smolts migrating in river (undetected at Snake River transportation collector sites), and SAR_{LGR-10-LGR} is a weighted estimate that is obtained by taking the proportion of the total population of smolts (tagged and untagged) at Lower Granite Dam in each study category and multiplying by the respective study category's SAR_{LGR-10-LGR}. In effect, the weighted SAR_{LGR-10-LGR} is the estimated SAR for the overall hatchery release (without jacks). The data presented in Table 3 were taken from various chapters and appendices of the 2013 CSS Annual Report, which can be downloaded from the FPC webpage <http://www.fpc.org/documents/CSS.html>. Finally, Figure 12 below shows a time series of the Weighted SAR_{LGR-10-LGR} over the years of available data for Clearwater Hatchery spring Chinook.

Table 3. Clearwater Hatchery spring Chinook survivals from CSS, as presented in the 2012 CSS Annual Report.

Release Date(s)	Migration Year ^A	Species	Juvenile			Adult Survival		
			Survival (LGR-BON)	Proportion Transported	T/C Ratio	SAR(T) %	SAR(C ₀) %	Weighted SAR _{LGR-to-LGR}
3/22-4/3	2006	SpCH	0.64	0.63	1.11	0.63	0.57	0.57
3/6-3/31	2007	SpCH	0.78	0.12	1.47	0.41	0.28	0.30
3/19-4/6	2008	SpCH	0.58	0.44	0.91	0.93	1.03	0.97
3/23-4/8	2009	SpCH	0.63	0.25	1.35	0.89	0.66	0.71
3/2-3/29	2010	SpCH	0.66	0.14	1.33	0.60	0.45	0.48
3/21-4/4	2011 ^B	SpCH	0.49	0.25	0.66	0.09	0.14	0.14
3/26	2011 ^B	SuCH	0.62	0.38	0.33	0.08	0.26	0.18 ^D
3/21-4/5	2012 ^C	SpCH	0.65	0.16	N/A	N/A	N/A	N/A
3/26	2012 ^C	SuCH	0.63	0.15	N/A	N/A	N/A	N/A

^A Smolt migration year 2006 through 2010 use combined TWS and BWS data.

^B Adult returns for migration year 2011 are incomplete with Age 2-salt adult returns through 9/15/2013.

^C No adult returns to date, only juvenile metrics available for estimation.

^D Weighted SAR_{LGR-to-LGR} (without jacks) not reported 2013 CSS Report but available on-line. Overall Annual SARs for Zones in the Snake and Columbia Rivers (http://www.fpc.org/survival/smolttoadult_queries.html).

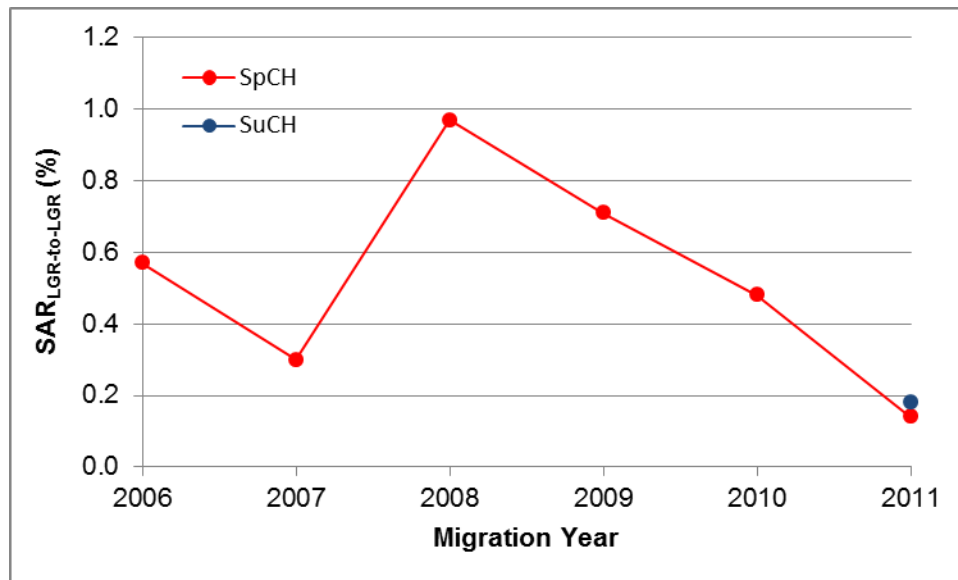


Figure 12. Weighted SAR_{LGR-to-LGR} for Clearwater Hatchery spring Chinook (2006–2011) and summer Chinook (2011). Adult returns for migration year 2011 are incomplete, with Age 2-salt adult returns through 9/15/2013.

We hope that the information we have provided regarding the use and application of information from the marked groups over the last several years is of some use to you. If you would like any additional information regarding these releases please feel free to contact us.

cc: Pete Hassemer, IDFG
 Bill Tweit, WDFW
 Jay Hesse, Nez Perce
 Tony Nigro, ODFW
 Howard Schaller, USFWS
 FPAC